

# **Environment, Health and Safety Plan for LBNL Berkeley West Biocenter**

**Building #977  
717 Potter Street  
Berkeley, CA 94710-2722**

**E.O. Lawrence Berkeley National Laboratory**

**As defined by**

**Environment, Health and Safety Division  
Lawrence Berkeley National Laboratory  
University of California  
Berkeley, CA 94720**

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **CONTENTS**

<b>Preface .....</b>	<b>iv</b>
<b>Reviews and Approvals .....</b>	<b>vi</b>
<b>Biocenter Safety Policy .....</b>	<b>vii</b>
<b>1.0 Introduction.....</b>	<b>1</b>
1.1 Purpose.....	1
1.2 Applicability.....	1
1.3 Changes.....	1
1.4 Review .....	1
1.5 Administrative Control of the Facility .....	1
1.6 Health & Safety Guidance .....	1
<b>2.0 Responsibilities and Authorities.....</b>	<b>3</b>
2.1 General.....	3
2.2 Division Directors.....	3
2.3 Supervisors/Principal Investigators.....	3
2.4 Facility Manager .....	4
2.5 Biocenter Receiving Staff .....	5
2.6 Biocenter Safety Coordinator.....	5
2.7 Biocenter EH&S Liaison .....	6
2.8 Employees, Supplemental Labor, and Participating Guests .....	7
<b>3.0 Biocenter Research Activities and Associated Hazards .....</b>	<b>9</b>
3.1 Biocenter Research Activities .....	9
3.2 Hazards .....	9
<b>4.0 Hazard Controls.....</b>	<b>12</b>
4.1 General Operational Requirements.....	12
4.2 Hazards Review .....	12
4.3 Requirements for Safety Documentation.....	12
4.4 Access Controls .....	13
4.5 Working Off-Normal Hours.....	13
4.6 No Eating, Drinking, Smoking, Applying Cosmetics, or Storing Food in the Laboratories .....	13
4.7 Housekeeping/Personal Hygiene .....	13
4.8 Warning Signs and Devices .....	14
4.9 Procurement of Hazardous Materials.....	14
4.10 Transportation of Hazardous Materials.....	15
4.11 Electrical Controls .....	15
4.12 Motion Controls .....	16

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

4.13	Pressure Controls .....	17
4.14	Heat Controls .....	17
4.15	Chemical Controls .....	17
4.16	Carcinogenic Material Controls .....	19
4.17	Cryogenic Material Controls .....	19
4.18	Biological Material Controls .....	19
4.19	Storage Practices for Chemicals .....	20
4.20	Inventory Controls for Hazardous Materials .....	21
4.21	Noise Control .....	21
4.22	Ionizing Radiation Controls .....	21
4.23	Non-Ionizing Radiation Controls .....	23
4.24	High Magnetic Field Controls .....	23
4.25	Personal Protective Equipment (PPE) .....	23
4.26	Ergonomic Controls .....	24
4.27	Seismic Controls .....	24
4.28	Engineering Controls .....	24
4.29	Maintenance, Inspection and Quality Assurance of Safety Systems and Equipment .....	25
4.30	Environmental Controls .....	26
4.31	Waste Controls .....	27
4.32	Waste Minimization/Reduction Controls .....	28
4.33	Spill Control .....	28
<b>5.0</b>	<b>Work Authorizations .....</b>	<b>30</b>
5.1	Health and Safety Manual .....	30
5.2	Biohazard Registration and Use Authorizations .....	30
5.3	Radiation Use Authorizations .....	30
5.4	Environmental Authorizations .....	30
<b>6.0</b>	<b>Training .....</b>	<b>31</b>
6.1	General .....	31
6.2	Responsibility for Training .....	31
6.3	Training of Newly Assigned Personnel .....	31
6.4	Training of All Personnel .....	31
<b>7.0</b>	<b>Reporting .....</b>	<b>33</b>
7.1	Emergency Reporting .....	33
7.2	DOE Reporting .....	34
7.3	Environmental Release Reporting .....	35
<b>8.0</b>	<b>Feedback and Improvement .....</b>	<b>36</b>

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

<b>9.0</b>	<b>References .....</b>	<b>37</b>
------------	-------------------------	-----------

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

**July 2006**

## **PREFACE**

The Berkeley West Biocenter (Bldg. #977, or the “Potter Street Building”) located at 717 Potter Street is part of E.O. Lawrence Berkeley National Laboratory (LBNL). It is a 93,000 square foot facility located off the main campus, one block north of Ashby and between 7th Street and the train tracks/Interstate-80. It is one of 1 of 14 buildings located in Wareham development’s Aquatic Park Center Campus. UC/LBNL currently leases 72,000 and the building is shared with Bayer HealthCare on the ground floor. The building is managed by the Wareham Property Group.

Acquisition of off-site lab space was driven by unprecedented growth in biology programs at both LBNL and the University of California Berkeley and their inability to provide quality research space for those programs, primarily housed in LBNL Buildings 74, 83 and the Donner Laboratory (Building 1) on campus. The new site will also provide room for a bioinstrumentation group. In all, about 200 scientists and staff are planned for the Berkeley West Biocenter (Biocenter). The initial five-year term of the lease includes options to renew for up to 20 years. The Laboratory’s tenure will depend upon the progress of capital projects on the main LBNL campus, on the “Hill.”

The building provides room for key groups within LBNL’s Life Sciences Division (LSD), Physical Biosciences Division (PBD), and for associated University of California Berkeley research groups who occupy the building as guests of LBNL. The PBD’s Synthetic Biology Department will be centered at the Biocenter, positioning it for future DOE funding in areas such as environment and renewable energy. The new building will also enable programs in Biological and Environmental Research (BER) such as Genome: GTL science, low-dose radiation, DNA repair, and functional genomics.

Lawrence Berkeley National Laboratory (LBNL) is responsible for providing ES&H support to the Biocenter including support activities to comply with the University of California contract with the Department of Energy, and applicable Federal, State and local laws and regulations. The definition and implementation of the Berkeley West Biocenter Safety Plan is the responsibility of LBNL, and all activities will be conducted safely through the utilization of the LBNL safety procedures and protocols. Adherence to the Safety Plan (SP) is the responsibility of each Biocenter employee and guest, with the Biocenter having overall responsibility.

Lawrence Berkeley National Laboratory’s (LBNL) Environmental, Safety, and Health (ES&H) policy states that all operations must be planned and performed safely, with full consideration for the protection of employees, the public, and the environment. In addition to following LBNL policies contained in the Health & Safety Manual (PUB-3000), employees shall comply with applicable federal, state, and local regulations when conducting any activity. The safety controls specified in this plan must be followed to ensure the safe and efficient conduct of all operations at the Biocenter. Any operation conducted at this facility that does not meet the requirements of the SP and PUB-3000 will require an approved Activity Hazard Document (AHD) that specifically addresses responsibilities, hazards, and necessary controls to conduct the operation safely.

Everyone who enters the area (including employees, visitors, and consultants) must follow the

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

**July 2006**

applicable requirements in this SP. All individuals are expected to protect themselves and others from the risk of injury or illness. Regular facility occupants are expected to guide and govern visitors and assist new or temporary occupants in understanding and following this procedure. When there are any doubts regarding the safety of any phase of work, personnel shall check with the Biocenter EH&S Liaison.

Changes to the SP shall be approved by PBD and LSD management and the LBNL Environment, Health & Safety Division (EH&S) Director. This SP shall undergo annual review to establish at a minimum that its contents are appropriate and adequate for current operations. LBNL Environment, Health & Safety Division assists the Biocenter management in instituting and maintaining a minimum-risk and environmentally sound work environment. Any employee of the Biocenter shall order any activity stopped immediately if, in his/her judgment, the procedure or circumstances represent an imminent risk or threat to human safety or health (see PUB-3000, Chapter 1).

# Environment, Health & Safety Plan for Berkeley West Biocenter

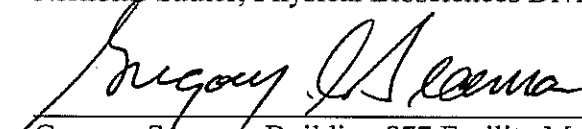
July 2006

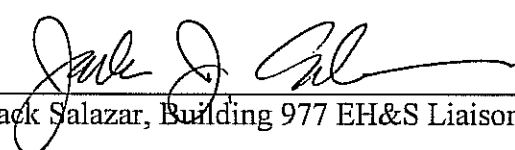
## REVIEWS AND APPROVALS

This Safety Plan was reviewed by:


  
\_\_\_\_\_  
Tony Linard, Life Sciences Division Safety Coordinator Date 7/26/06

  
\_\_\_\_\_  
Nicholas Sauter, Physical Biosciences Division Safety Coordinator Date 8/3/2006

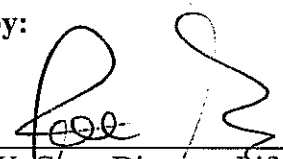
  
\_\_\_\_\_  
Gregory Seaman, Building 977 Facility Manager Date 8/21/06

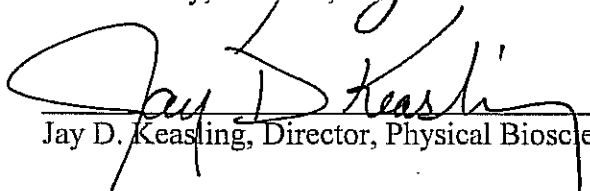
  
\_\_\_\_\_  
Jack Salazar, Building 977 EH&S Liaison Date 8/28/06

Submitted by:

  
\_\_\_\_\_  
Howard K. Hatayama, Acting Director, Environment, Health & Safety Division Date 8/30/06

Approved by:

  
\_\_\_\_\_  
Joe W. Gray, Director, Life Sciences Division Date 9/12/06

  
\_\_\_\_\_  
Jay D. Keasling, Director, Physical Biosciences Division Date 31 October 2006

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **BERKELEY WEST BIOCENTER SAFETY POLICY**

The principal Berkeley West Biocenter safety policy is to ensure that all operations are planned and executed in a way which insures that every reasonable precaution is taken to protect the health and safety of each employee, the public, the environment, and to prevent damage to property.

A sound safety policy starts with every employee assuming his or her part of the responsibility for safety. Individual employee responsibilities with regard to safety include, but are not limited to the following:

- Stopping any operation whenever there is reason to believe that continuing it will lead to injury, illness, environmental contamination or property damage.
- Bringing to their supervisor's attention any behavior or condition that could cause an injury or illness, environmental contamination, or could lead to property damage.
- Learning and complying with prescribed safety procedures, including the wearing and use of specified safety apparel and equipment.
- Reporting, as soon as possible, to their supervisor and to the Biocenter EH&S Liaison, or designee, any work-related injury, illness, or possible exposure to toxic or biohazardous materials or an environmental spill.

Program management and supervisors are responsible for conducting their activities in a manner that actively supports the basic safety policy outlined above. They are also responsible for planning and conducting operations in a way that minimizes risk of injury or damage to property, and for maintaining surveillance of the workplace to ensure the preceding is being accomplished. In the event of an accident, managers and supervisors are required to conduct a prompt investigation to determine the root cause and to initiate actions that will prevent a recurrence or similar incident.

The LBNL EH&S Division is responsible, through subject matter experts (SMEs) assigned to support the Biocenter, to provide supervisors and employees with safety guidance and services as outlined in PUB-3000. The primary contact for the EH&S Division is the Biocenter EH&S Liaison.

All employees and visitors should conduct their activities in accordance with the above stated safety policy. If all employees take their responsibilities for safety seriously, they can be assured of a safe and healthy workplace.

The PBD & LSD management has overall authority for the approval of Biocenter Program safety documentation.



# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

## **1.0 INTRODUCTION**

- 1.1 Purpose:** In order to ensure that all activities are conducted safely, it is essential that all staff be aware of the hazards posed by all chemicals and equipment used in the facility, and that they understand how to protect themselves, their co-workers, and the environment from these hazards. This Environment, Health & Safety Plan (SP) describes the safety regulations required for the safe conduct of operations using potentially hazardous materials at the Berkeley West Biocenter (Biocenter, the Potter Street Building, Building #977) located at 717 Potter Street in Berkeley, California; as well as, the responsibilities and authorities of building personnel for ensuring safe operations, and for identifying operational hazards and environmental concerns and their controls. In addition, this SP prescribes facility-specific training requirements and emergency controls as well as maintenance and quality assurance requirements for ES&H-related building systems. The controls established for this facility conform to and supplement the LBNL PUB-3000.
- 1.2 Applicability:** The requirements set forth in this SP apply to all operations within building space assigned to E.O. Lawrence Berkeley National Laboratory (LBNL). Safety regulations in this SP and PUB-3000 shall apply to all participants in Potter Street operations, including staff members, contract workers, support and service staff, participating guests, short term & long term visitors, and summer students. Bayer employees and guests operating in non-LBNL space at 717 Potter Street are not covered by this safety plan.
- 1.3 Changes:** Any change in operations at this facility that alters the scope of this SP or decreases the safety and/or environmental controls specified in this SP shall not be made until a revision or addendum to this SP has been approved by the Biocenter. Any change in operations that does not decrease the safety and/or environmental controls requires the joint approval of the Authorizing Individual in consultation with the Biocenter EH&S Liaison. Proposed changes in building safety and environmental control systems require a design review and must be approved.
- 1.4 Review:** This SP shall be formally reviewed and issued at a minimum annually to ensure that its contents are appropriate and adequate for current operations. If changes are necessary before the review date, the SP will be amended and the changes approved by the Biocenter.
- 1.5 Administrative Control of the Facility:** The Biocenter conducts biology program work in support of the E.O. Lawrence Berkeley National Laboratory (LBNL). The Biocenter is administered by the E.O. Lawrence Berkeley National Laboratory (LBNL).
- 1.6 Health and Safety Guidance**
- 1.6.1 LBNL, *Integrated Environment, Health and Safety Management Plan*, PUB-3140.
- 1.6.2 LBNL, *Health & Safety Manual*, PUB-3000. The official version of PUB-3000 is located on the web at <http://www.lbl.gov/ehs/pub3000/>. Hard-copy versions of

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

PUB-3000 may not reflect the current web version.

- 1.6.3 LBNL, *Chemical Hygiene and Safety Plan*, PUB-5341.
- 1.6.4 LBNL *Self-Assessment Manual*, PUB-3105.
- 1.6.5 LBNL *Guidelines for Generators to Meet HWHF Acceptance Requirements for Hazardous, Radioactive, and Mixed Wastes*, PUB-3092.
- 1.6.6 LBNL *Guidelines for Management of Waste Accumulation Areas (WAAs)*, PUB-3093.
- 1.6.7 LBNL *Radiation Protection Program for the Lawrence Berkeley National Laboratory*, 6<sup>th</sup> edition
- 1.6.8 LBNL *Integrated Safety Management for Employees, Contractors, Participating Guests, and Visitors. Handbook of Safety Policy, Requirements, and Technical Guidance*, PUB-811.
- 1.6.9 LBNL *General Employee Radiological Training at Berkeley Lab (GERT)*, PUB-3152.
- 1.6.10 Other health and safety references: Other documents may be obtained by request from the Building Manager.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **2.0 RESPONSIBILITIES AND AUTHORITY**

- 2.1 General:** The overall ES&H responsibility for the Biocenter program lies with the Directors of the Life Sciences and Physical Biosciences Divisions. In addition, the responsibility for ES&H support is assigned to the LBNL Environment, Health & Safety Division Director.
- 2.2 Division Directors:** The Life Sciences Division Director and the Physical Biosciences Division Director have joint responsibility for the integrated ES&H program for all activities, personnel and facilities at the Biocenter.
- 2.3 Supervisors/Principal Investigators:**
- As line managers, provide work conditions that protect the safety and health of all employees, and the environment and all Biocenter equipment and property.
  - Support Integrated Functional Appraisal (IFA) and Self-Assessment inspections and ensure resolution of action items.
  - Inform employees of health, safety and environmental hazards and ES&H requirements.
  - Make sure employees have proper resources and are properly trained, and report all work related injuries and illnesses or environmental spills.
  - Maintain a chemical inventory.
  - Maintain required ES&H-related records, and assure that all activities performed in rooms under their control are compatible with requirements specified in this SP.
  - Perform periodic safety walk-throughs.
- 2.3.1 Safety Documentation and Approvals:**  
Initiate and coordinate the development of appropriate safety procedures.  
Perform hazard assessments as necessary.
- 2.3.2 Health Services:**  
Report Injuries / Illnesses through the appropriate line management channels, and notify the Biocenter Building Manager and other parties, as appropriate.
- 2.3.3 Employee Health and Safety:**  
Identify employee health and safety issues and request EH&S assistance through the Division Safety Coordinator or Biocenter EH&S Liaison.
- 2.3.4 Training:**
- Provide at-the-bench training when appropriate.
  - Review training requirements for new employees and those assigned to new job functions.
  - Ensure training classes are completed.
- 2.3.5 Emergency Services:**
- Notify Biocenter EH&S Liaison and Building Manager of hazardous material spills and other adverse ES&H events.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- Ensure the facility occupants are aware of emergency procedures and implementation.

## **2.3.6 Compliance Reporting:**

Prepare documentation to address regulatory requirements with the assistance of the Biocenter EH&S Liaison, as necessary.

## **2.3.7 Human Subjects:** Initiate Institutional Biosafety Committee (IBC) and Institutional Review Board (IRB) approval.

## **2.3.8 Waste:** Assure hazardous waste generators are appropriately trained and that Satellite Accumulation Areas (SAAs) and Waste Accumulation Area (WAA) requirements are satisfied. Assure biohazardous waste generators are trained and that Medical Waste requirements are satisfied.

## **2.3.9 Maintenance of Safety Systems:** Notify Building Manager of maintenance issues.

## **2.4 Building Manager:**

- Ensures that all operations scheduled to take place in a facility covered by this SP are compatible with the facility and that all physical controls required by the SP are in place and operational.
- Provide daily surveillance of all facilities covered by this SP and report and correct any deficiencies in facility safety devices.
- Communicate ES&H issues with the Biocenter EH&S Liaison and the LSD & PBD Safety Coordinators.
- Participate in IFA/Self Assessment inspections and coordinate resolution of action items.
- Participate in Biocenter Technical and Business Operations meetings and safety activities.
- Manage maintenance of facility safety systems with Wareham Properties staff.
- Coordinates security, building maintenance, and tenant improvement construction with Wareham Property Group.

## **2.4.1 Safety Documentation and Approvals:** N/A

## **2.4.2 Health Services:** N/A

## **2.4.3 Employee Health and Safety:** Interface with Biocenter staff, the Biocenter EH&S Liaison, and LSD & PBD Safety Coordinators on health and safety issues.

## **2.4.4 Training:** Coordinate training for Facilities staff performing building maintenance, renovation, and service functions with the LSD / PBD Safety Coordinators and Biocenter EH&S Liaison.

## **2.4.5 Emergency Services:**

- May serve as an Emergency Team Manager.
- Contact LBNL Waste Group for hazardous materials spill cleanup assistance

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

when appropriate.

- Report adverse ES&H events to Biocenter EH&S Liaison and to the EH&S Incident Reporting number (x6999).
- Support Biocenter management and LSD & PBD Safety Coordinators for characterization of reportable events and notify Biocenter EH&S Liaison of reportable events.
- Monitor police surveillance.

## **2.4.6 Compliance Reporting:**

- Report accidental environmental releases to the Biocenter EH&S Liaison and to the EH&S Incident Reporting number (x6999).
- Assist LBNL, as necessary, with preparation of regulatory reporting requirements.

## **2.4.7 Human Subjects: N/A**

## **2.4.8 Sanitary (Non-Hazardous) Waste: Coordinate sanitary waste pickup (i.e., regular garbage service).**

## **2.4.9 Maintenance of Safety Systems: Manage building and equipment maintenance for safety systems including facility maintenance contract with outside vendors.**

## **2.5 Biocenter Receiving Staff: Staff with receiving and shipping responsibilities at the Biocenter must assure compliance with DOT and LBNL Transportation requirements. They must coordinate with the main Transportation Group in Building 69, as necessary.**

## **2.6 LSD and PBD Safety Coordinators:**

- Serve, with the Biocenter Building Manager, as contact for health and safety issues.
- Implement the Self-Assessment program in accordance with LBNL PUB-3105

### **2.6.1 Safety Documentation and Approvals:**

- Facilitate the NEPA / CEQA process.
- Coordinate the development of Activity Hazard Documents.
- Maintain the Hazards, Equipment, Authorization and Review (HEAR) system or alternative.

### **2.6.2 Health Services: Assist, if necessary, in the provision of appropriate LBNL health support services.**

### **2.6.3 Employee Health and Safety:**

- Provide continuous and ongoing safety support to the research effort.
- Assist in the coordination of appropriate EH&S support for health and safety issues.
- Coordinate chemical inventory maintenance with Biocenter supervisors and staff.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

- 2.6.4 Training: Assist Supervisors/PIs in coordinating employee training.
- 2.6.5 Emergency Services:
- Serve on the Building Emergency Team, as appropriate.
  - Assist, as necessary, in support of Occurrence Reporting.
- 2.6.6 Compliance Reporting: Coordinate the reporting of events, as necessary, and assist the Biocenter EH&S Liaison in the preparation of regulatory reporting.
- 2.6.7 Human Subjects: N/A
- 2.6.8 Waste:
- Provide oversight and coordinate training to the Biocenter hazardous and biohazardous waste management systems.
- 2.6.9 Maintenance of Safety Systems: Assist, as necessary, in the resolution of facility maintenance issues.

## **2.7 Biocenter EH&S Liaison:**

- Provide health, safety and environmental support services to the employees and staff of the Biocenter as outlined in LBNL PUB-3000.
- Provide a central point of contact between the Biocenter and the LBNL EH&S Division.
- Manage IFA process with the assistance of the Building Manager and the LSD & PBD Safety Coordinators, to assure compliance with LBNL safety requirements.
- Support Self-Assessment Inspections.
- Assist Biocenter staff and PIs with the hazard assessment and mitigation process.

### **2.7.1 Safety Documentation and Approvals:**

- Assist LSD & PBD Safety Coordinators in the development of Activity Hazard Documents (AHDs).
- Assist LSD & PBD Safety Coordinators in maintaining the HEAR database or alternative.
- Assist PIs in identifying safety procedure needs and review of the procedures.
- Assist, as necessary, the LSD & PBD Safety Coordinators with the preparation of NEPA/CEQA documentation.

### **2.7.2 Health Services:**

- Identify employees needing to participate in the medical surveillance program.
- Assist in coordinating with LBNL Health Services for new employee physicals and medical surveillance.
- Coordinate with LBNL EH&S Division for processing and reporting Injury / Illness Reports.
- Assist in arranging for other health services, as needed (e.g. medical surveillance and respirator qualifications / medical certification).

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

## **2.7.3 Employee Health and Safety:**

- Provide environmental protection, safety and health consultation for employees per guidelines of the LBNL Health & Safety Manual, Publication 3000.
- Provide periodic ES&H inspections of the facility.
- Provide ongoing safety support to the research and building maintenance efforts.
- Assist in the coordination of appropriate EH&S support for health and safety.

## **2.7.4 Training: Provide training as required.**

## **2.7.5 Emergency Services:**

- Stay informed of issues affecting emergency services.
- Coordinate with the Building Manager and the LBNL Emergency Services staff for services and/or changes in Emergency Services documents including the Building Emergency Plan.

## **2.7.6 Compliance Reporting:**

- Report accidental releases to the LBNL Environmental Protection Group and to Emergency Services.
- Ensure required regulatory reports are prepared.

## **2.7.7 Human Subjects:**

Assist in obtaining IBC and IRB Approvals.

## **2.7.8 Waste:**

Provide coordination with LBNL Hazardous Waste Group for Hazardous Waste and Medical Waste management and oversight services.

## **2.7.9 Certification of Safety Systems:**

Ensure routine surveys of fume hoods and ventilation system performance are performed.

## **2.8 Employees, Supplemental Labor, and Participating Guests:**

Employee, Supplemental Labor, and Participating Guest responsibilities with regard to health, safety and the environment include, but are not limited to, the following:

- 2.8.1 Adherence to the policies included in LBNL Publication 811, Handbook of Safety Policy, Requirements, and Technical Guidance, August, 1998.
- 2.8.2 Stopping any operation whenever there is reason to believe that continuing it will lead to injury, illness, or property damage.
- 2.8.3 Bringing to their supervisor's attention any behavior or condition that could cause an injury or illness or could lead to property damage.

## **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

- 2.8.4 Learning and complying with prescribed safety procedures, including the wearing and use of specified safety apparel and equipment.
- 2.8.5 Reporting, as soon as possible, to their supervisor and to the Building Manager any work related injury, illness, or possible exposure to toxic or biohazardous materials or hazardous material release to the environment.



# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

## **3.0 RESEARCH ACTIVITIES AND ASSOCIATED HAZARDS**

- 3.1 Biocenter Research Activities:** The Biocenter is a multidisciplinary research facility for research in biosciences. This includes synthetic biology, cell and molecular biology, cancer research, and quantitative biology. In addition, the Synthetic Biology Department has plans for future program and funding development in environmental remediation, renewable energy, and human health. Other programs planned in biological and environmental research include “Genomics: GTL” science, low-dose radiation, DNA repair, and functional genomics.

The first scientists from the Synthetic Biology Design Team to occupy the Biocenter include Jay Keasling, Carlos Bustamante, Adam Arkin and Daniel Fletcher (expected in 2006), plus administrative and management staff from the Physical Biosciences Division. Together, they will comprise the Berkeley Center for Synthetic Biology, a joint program of the California Institute for Quantitative Biomedical Research and LBNL. They share the building with Berkeley Lab Life Sciences Director Joe Gray and former director Mina Bissell, Mary Helen Barcellos-Hoff, and Paul Yaswen.

## **3.2 Hazards**

- 3.2.1 Electrical Hazards:** Many instruments throughout the building operate with hazardous voltages. Some, such as non-commercial apparatus, may not be Underwriter Laboratory certified and may have electrical safety features that can be defeated through direct intentions, carelessness, or neglect. These hazardous voltage sources may cause electrical shock and may result in injury or death.

### **3.2.2 Motion Hazards:**

- 3.2.2.1 Centrifuges:** Centrifuges are a very common piece of equipment located throughout Biocenter laboratories. While recent evidence suggests that personal injury and/or property damage can be adequately addressed by engineering controls installed by the manufacturer, it is recommended that operators of this equipment exercise caution to minimize the potential for personal injury and/or property damage.
- 3.2.2.2 Robotics including fluid delivery systems:** These are very common in state-of-art bioscience facilities and are critical for high throughput screening to identify biological probes and to provide small molecule leads for drug discovery. The machines include one or more movable arms with probes and improper use can result in personal injury.
- 3.2.2.3 Vehicular Traffic:** The facility has various utility vehicles and multiple delivery vehicles, presenting the common hazards of vehicle operation combined with pedestrian traffic.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

**July 2006**

- 3.2.3 Pressure Hazards: Compressed gas cylinders are present in the facility. The energy released upon failure or rapid de-pressurization of these systems may be imparted through fragments or pressure waves. The consequences of this hazard may include injury, loss of hearing, fire and property damage.
- 3.2.4 Heat Hazards: Common operations throughout the complex present possible heat source hazards that could result in injury or death, equipment failure, or facility fire. Open flames from Bunsen burners or propane burners may be present and are potential ignition sources.
- 3.2.5 Chemical Hazards: General operations in Building 977 involving the use, storage, and disposal of chemicals present a variety of hazards. Such hazards exist due to the unique toxic, fire, carcinogenic, and physical nature of each chemical, by itself or in combination with other chemicals. Toxic materials include, but are not limited to, carcinogens, reproductive toxins, mutagens, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.
- 3.2.6 Carcinogenic Material Hazards: Formaldehyde, chloroform, acrylamide, methylene chloride, chloramphenicol or other similar carcinogens may be present in the laboratories. These materials may cause cancer upon prolonged or repeated exposure. Small amounts of mutagenic (e.g., ethidium bromide) and teratogenic materials may also be stored and used in the laboratories in the Biocenter.
- 3.2.7 Cryogenic Material Hazards: The Biocenter has many liquid nitrogen dewars for the preservation of biological materials. In addition, the Mass Spectrometer (Mass Spec) machine located in Lab #165 makes use of other cryogenic liquids. These liquids and evolving gases present multiple hazards, from skin and eye burns to possible oxygen deficiency.
- 3.2.8 Biological Material Hazards: Biological materials include both Risk Group 1 and Risk Group 2 materials, although the vast majority is Risk Group 1 and do not present a hazard to normal healthy adults under normal circumstances. Risk Group 1 biological materials include, but are not limited to, human DNA, lab strains of E coli (e.g., K-12), and many animal cell lines. Risk Group 2 biological materials include some viral vectors and human cell lines. Risk Group 3 materials are not allowed.
- 3.2.9 Ionizing Radiation Hazards: Radioactive materials are used in two laboratories at the Biocenter: Lab 205, and Lab 285. Typically, these labs use beta-particle emitting radionuclides such as Phosphorus-32 (P-32), Phosphorus-33 (P-33), Sulfur-35 (S-35), Hydrogen-3 (Tritium – H-3), and Carbon-14 (C-14). Cadmium-109 (Cd-109), an x-ray emitter, is used in one laboratory. All work with radioactive materials must be authorized via an EH&S Radiological Work Authorization (RWA).

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

An X-ray machine is located in the Biocenter in Lab 203. This is a fully enclosed 160kV 10mA device accessible only to those with an approved card key. Use of an X-ray machine must be authorized via an EH&S X-ray Authorization (XA).

3.2.10 Non-Ionizing Radiation Hazards: Ultraviolet radiation may be present in biosafety cabinets or in illuminator boxes used for viewing gels. Its usefulness is limited by its low penetrating power. UV radiation is commonly used in conjunction with unoccupied clean rooms, and biological safety cabinets. The eye and skin can be damaged by exposure to direct or strongly reflected ultraviolet radiation.

3.2.11 High Magnetic Fields: The Mass Spectrometer machine located in Lab #165 utilizes the creation of a strong magnetic field. Large attractive forces are exerted on magnetic materials or equipment brought in close proximity to the Mass Spec. The force may become large enough to move tools or equipment uncontrollably towards the magnet system and the closer to the magnet system, the larger the force. The field may also disrupt the cardiac pacemaker in persons having a pacemaker implant.

Risks come from release of any steel items/tools or equipment which are bought near the magnets. Even belt buckles, steel tipped shoes *etc.* may be strongly attracted to a magnet. This might result in damage to the magnets/probes (possibly resulting in a quench) or serious injury or death to personnel working near or under a magnet.

3.2.12 Ergonomic Hazards: There exists a high potential for cumulative trauma disorder (CTD) injury in several operations in Biocenter as a result of repetitive motion. These areas include continuous work at activities such as computer work or pipetting. Symptoms of CTD injuries are manifested in aches, tingling, numbness, pain, and discomfort in the upper extremities (arms, wrists, hands, back, neck, and eyes). Disregarding these symptoms can result in long-term injury or disability.

3.2.13 Environmental Hazards: Hazardous materials may be accidentally released into the sanitary sewer or the storm drain system. Atmospheric releases of volatile materials may also occur, and every attempt will be made to minimize these releases.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **4.0 HAZARD CONTROLS**

- 4.1 General Operational Requirements:** Policies of funding agencies and governmental jurisdictions including the Department of Energy, the California Environmental Protection Agency, the City of Berkeley, the University of California, and the Lawrence Berkeley National Laboratory require certain research activities to be regulated or monitored to establish procedures for the safe use and disposal of hazardous materials and care for the subjects involved in the research activities.

All research activities involving the use of human subjects and biohazardous materials or DNA technology will require institutional review with the Human Subjects Committee, and the Biosafety Committee, respectively. Contact the Biocenter EH&S Liaison for more information on working with these committees

Institutional Human Subjects Committee: Federal regulations and LBNL policy require that approval by the Institutional Human Subjects Committee be obtained before any research project involving use of human subjects, or human tissue, is initiated to protect the rights and welfare of individuals who volunteer to become subjects in research projects.

Institutional Biosafety Committee: Federal regulations under 29 CFR 1910.1030 require that any work with human blood or human bloodborne pathogens and under 42 CFR Part 72 for any work with infectious materials be reviewed to determine exposure potential for employees. The IBC is charged to review all research protocols involving the use of biohazardous materials (i.e., infectious agents to man) and recombinant DNA technology. In addition, the IBC is responsible to determine whether the protocol would comply with applicable rules and regulations, and that it meets appropriate biosafety containment standards as set forth by the National Institutes of Health Guidelines on recombinant DNA.

- 4.2 Hazards Review:** Hazards Analysis for an overall operation shall be performed to determine the level of occupational risk. Principal Investigators and Supervisors are required to perform a hazard analysis of all hazardous activities. Requirements and guidance for hazard analysis is included in PUB-3000, Chapter 6. Hazard analysis for microbiological and biochemical activities must consider factors such as pathogenicity of infected materials, chemical hazards, physical hazards, electrical hazards, exposure doses, routes of exposure, and host susceptibility. Personnel exposure may result from: the use of toxic chemicals; laboratory-acquired infections; dermatitis from the use of soaps, detergents, solvents, cleaners, and disinfectants; cuts, lacerations, punctures from needle-sticks or use of "sharps;" burns from handling hot or chemically treated items; and employee sensitization to specific allergenic substances. Any of the above-listed hazards may also be encountered while handling the respective hazardous and biohazardous waste. General information regarding each of the hazards identified below is in the PUB-3000.
- 4.3 Requirements for Safety Documentation:** Laboratory activities for the above processes involve chemicals and activities commonly found in research laboratories. Common

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

activities include use of the following:

- 4.3.1 Flammable liquids in quantities and in appropriate containers when used and stored in compliance with the procedures outlined in PUB-3000, Chapter 12 and the LBNL Chemical Hygiene and Safety Plan (CHSP), Section G.
- 4.3.2 Acids, bases, and solvents used in small quantities and in combinations not expected to produce unusual hazards. Refer to LBNL PUB-3000, Chapter 4 and the CHSP, Section G.
- 4.3.3 Biological operations are limited to Biosafety Level (BL) 1 and Biosafety Level (BL) 2 activities and limited to small, non-production, research-laboratory scale amounts. The LBNL Biosafety Website and Manual provides additional guidance.

New activities and activities which introduce new hazards or increase the hazard level require a revised hazard review. Activities requiring approved AHDs are described in the technical sections of PUB-3000, Chapter 6.

## **4.4 Access Controls**

- 4.4.1 Facility Access: Access to Building 977 is controlled. Both LBNL and Bayer staff must be authorized to enter the facility. All other personnel entering the building must also be authorized. LBNL Security (Barton) and Bayer Security (Allied) control access and ensure that both only LBNL and Bayer authorized staff and visitors are allowed into the building.
- 4.4.2 Roof Access: For Building 977, there is no routine roof access. All work has to be approved and performed by Landlord or Landlord's contractors.

## **4.5 Working Off-Normal Hours:** Although most of the work is conducted during regular business hours, some projects in the Biocenter operate 24 hours a day, and employees may work outside of normal business hours. See Section 7.0 for emergency information for off-normal hours

## **4.6 No Eating, Drinking, Smoking, Applying Cosmetics, or Storing Food in the Laboratories:** Employees shall follow this practice to effectively eliminate the hazard of ingesting a hazardous material or due to cross-contamination. There are some areas that are designated as "clean" within the laboratories (separated from areas where hazardous chemicals are present) where food and drink may be consumed.

## **4.7 Housekeeping/Personal Hygiene**

- 4.7.1 Good housekeeping is important to protect workers from occupational hazards in the laboratory. Floors must be cleaned and swept regularly. All aisles, hallways, and stairs must be kept clear. Access to emergency equipment and exits shall be clear and unobstructed.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

- 4.7.2 Fume hoods shall not be used for storage of materials and equipment merely as a matter of convenience. Separate storage areas shall be used to store equipment, chemicals in daily use, and waste (SAAs).
- 4.7.3 Personal hygiene is an important factor in reducing or minimizing exposure. Loose hair and clothing should be confined in work areas where potential exposure to hazardous materials exists. Employees are encouraged to wash hands frequently with water and mild soap or with an antiseptic cleanser whenever skin comes in contact with hazardous or infectious materials. Hands should always be washed before leaving the work area.
- 4.8 Warning Signs and Devices:** Warning signs are placed in a manner that is clearly visible to employees, visitors, and contractors. The Health Hazard Communication (Caution) signs are posted outside the doors of every laboratory. These signs indicate the specific hazard information and instructions to be followed within a room; all personnel shall strictly adhere to instructions on these signs. The use of signs shall be consistent with the LBNL Chemical Hygiene and Safety Plan (CHSP). The use of warning devices shall be consistent with PUB-3000 Chapter 4. Red push buttons are located throughout the laboratories to facilitate the once pass through of air in the event of a spill or release of hazardous materials.
- 4.9 Procurement of Hazardous Materials:** In the LBNL system some substances require EH&S Division review and approval prior to procurement. This is necessary to ensure that the use of the material(s) is evaluated in order to establish the necessary controls. These items include materials such as toxic gases, selected reactive (unstable) chemicals, drug precursors, etc. The Procurement Department maintains a list of restricted items. Individuals ordering materials must first consult this list and contact EH&S for the necessary review and approval. This can be coordinated through the Biocenter EH&S Liaison. The Procurement Department will also forward all applicable requests to the EH&S Division for approval prior to purchase.
- Ordering chemicals, including blanket order transactions, must be approved by the Principal Investigator, supervisor, or designated alternate in accordance with LBNL Procurement Department guidelines. After a blanket order is established, requisitions are still required for each release against that order (i.e., for each subsequent chemical purchase).
- The individual ordering chemicals is responsible for declaring the hazardous properties of those chemicals on the hazard review section of the Purchase Requisition.
- Line managers must obtain an MSDS for each chemical ordered unless it is already on file or is available electronically.
- Line managers must ensure that all incoming containers of hazardous materials have labels identifying the chemical, hazard warnings, manufacturer's name and address.
- Chemical purchases must be kept to the minimum amount required to conduct laboratory operations.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- 4.10 Transportation of Hazardous Materials not Classified as Waste:** Transportation of hazardous materials to and from the Biocenter must meet Department of Transportation (DOT) requirements for packaging and shipping. Hazardous materials used at the Biocenter should be procured and shipped directly from the manufacturer to the Biocenter. Only a minimum of hazardous materials should be transported from member laboratories to avoid potential transportation problems. Only properly trained employees shall transport hazardous materials and waste at the Biocenter.

**Vehicles:** Only a DOT authorized carrier or the LBNL Hazardous Waste Group authorized contractor is permitted to transport hazardous materials. Hazardous chemicals include all chemicals having an MSDS that identifies a hazard. Transportation of hazardous materials by Biocenter employees in public or private vehicles is not permitted because of the risk of spillage or breakage that might result in personal injury and/or property damage.

**Shipping requirements:** To ensure that regulatory and safety requirements are met, notify the Building Manager when hazardous materials are to be shipped. The Receiving Officer is responsible for packaging hazardous materials in compliance with the Code of Federal Regulations, 49 CFR, and IATA/ICAO (where applicable) for shipment off site and arranging for shipment by an approved carrier. As a back up, the Building Manager may notify LBNL Transportation Department of a pending shipment. In this situation the LBNL waste contractor is responsible for packaging the material for shipment in compliance with DOT standards and either transport of the material as the carrier or arranging for shipment by a DOT authorized carrier. As part of the safety support provided by LBNL, the Building Manager or researcher is responsible for completion of applicable documents, for providing assurance that applicable regulatory standards are met, and signing all shipping documents. LBNL is the shipper of record.

## **4.11 Electrical Controls**

**4.11.1 Electrical and Electronic Equipment:** All work with electrical and electronic equipment shall comply with the provisions of the PUB-3000, Chapter 8, "Electrical Safety." Personnel working on electrical and electronics equipment shall have Supervisory Authorization (PUB-3000, Chapter 8, Section 8.5) and shall have completed appropriate LBNL electrical safety training. Personnel working with or around high voltage and having access to energized components shall comply with additional training requirements. Compliance with Lockout-Tagout procedures is required. See the Building Manager or Biocenter EH&S Liaison for assistance.

**4.11.2 Electrophoresis equipment** frequently operates at hazardous voltages. Most modern electrophoresis equipment has built-in safety features to prevent electric shock to the user, but users of this apparatus must verify that the safety features are operational. Anyone using electrophoresis equipment must:

- Have ready access to the user manual for the specific equipment being used.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

- Read and understand the sections in the manual regarding safety practices and features.
- Consult the manual regarding the testing of safety interlocks at recommended intervals, and if testing is specified ensure appropriate documentation of testing exists.
- Use only nonmetallic vessels for secondary containment.
- Ensure that all electrical connectors are undamaged.
- Never use equipment which has been damaged or modified.

Some older equipment may not have built-in safety interlocks, and are significantly more hazardous. Such equipment may only be used if the cognizant supervisor verifies that hazardous voltage (>50 volts) will never be exposed to touch in any normal or abnormal configuration of the apparatus.

## **4.12 Motion Controls**

### **4.12.1. Centrifuges:**

a. All centrifuges (except bench-top clinical models) shall have interlocks that preclude starting of the centrifuge unless the cover is closed, and that prevent opening of the cover unless the rotor has essentially stopped moving. (Note: Current generation centrifuges all have this safety feature. Bench-top clinical centrifuges can be operated with adequate administrative controls).

b. The use of ultra centrifuge rotors shall be logged and the rotor speeds shall be rated in accordance with the manufacturer's recommendations. (This may vary from manufacturer to manufacturer.)

### **4.12.3 Robotics:**

Never remove safety devices such as shields, interlocks, and alarms that are designed to prevent injury. Follow the directions supplied by the manufacturer and do not attempt to troubleshoot the moving parts of the equipment with your hands while it is operating.

### **4.12.2 Vehicles**

4.12.2.1 Operation of government vehicles shall be in conformance with the LBNL PUB-3000 Chapter 5. A valid State Motor Vehicle Driver's License is required before the operation of any vehicle. Seat belts, when provided, must be worn by the driver and occupants of any vehicle.

4.12.2.2 A fork-truck operator's permit is required before an employee is permitted to operate a self-propelled forklift truck. The permit is issued by LBNL upon completion of EHS 225, Forklift Training. Arrangements for taking the course should be made through the Building Manager.



# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- 4.13 Pressure Controls:** Pressure operations shall be in conformance with the PUB-3000, Chapter 7. Each compressed gas system shall be equipped with a pressure relief valve set at no more than MAWP (Maximum Allowable Working Pressure). Employees engaged in cylinder set-up, installation, operation, and change-out shall complete the course EHS-231, "Compressed Gas Safety." All compressed gas cylinders shall be secured, when in storage or in use. Caps must be present on all cylinders not in use. Fuel cylinders shall be stored at least 20 feet from Oxidizers or separated by 30-minute firewall.
- 4.14 Heat Controls:** PUB-3000, Chapter 12, describes fire prevention and protection requirements. Personal protective clothing, including laboratory coat and appropriate insulated gloves, shall be worn when handling hot apparatus. Personnel will be familiar with the location and operation of fire extinguishers appropriate for the nature of the fuel and oxidizer. Exit corridors shall remain unobstructed to facilitate prompt evacuation of building occupants and access for emergency personnel. A minimum width of 36" aisle ways is required in labs, and 44" clearance is required for hallways and corridors in most office areas. For further information, contact the Biocenter EH&S Liaison.
- 4.14.1 Steam: The Building Manager manages a maintenance contract to provide routine and recurring service to boilers, autoclaves, and other safety devices. Biocenter personnel are not authorized to service, adjust, modify, or otherwise tamper with the autoclaves.
- 4.14.2. Autoclaves
- Autoclaves shall be installed, maintained and operated in accordance with the manufacturer's recommendations. (Note: This would include routine service of the steam generators and pressure relief valves through the manufacturer's service rep.)
  - Only personnel who have been properly trained in the operation of the specific autoclave used shall operate autoclaves.
  - Autoclaves in general shall only be used to sterilize dry materials. Liquids shall only be sterilized in autoclaves with automatic liquid cycles. (Note: Current generation autoclaves have this; the intent is to weed out the use of older manual sterilizers for liquid use.)
- 4.14.3 Flames: The use of open flames in the operation of standard laboratory gas burners does not require any specific approval if such flames are used in the intended fashion. Areas where burners are used must be of non-combustible construction and maintained free of combustible storage. All other operations including welding and open flame operations will require approval.
- 4.15 Chemical Controls:** In accordance with this Safety Plan, the Principal Investigator is responsible for identifying hazards and establishing controls. Some activities may require and an AHD to be followed during performance of each experimental task.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- 4.15.1 Toxic Materials: Chemicals should be used as outlined in LBNL Health and Safety Manual, Chapter 4, and the CHSP. Adequate ventilation must be provided for control of toxic dust, fumes, mist, gases, and vapors that may be generated from work operations. Personnel protective clothing, as prescribed in accordance with the LBNL PUB-3000, Chapter 19 shall be worn by all personnel handling toxic materials. Adequate training and information, as defined in the LBNL PUB-3000 and the CHSP, must be provided to employees who handle hazardous chemicals. Application of safe work practices applies to the handling of chemicals as reagents and as waste. No mercury thermometers shall be used unless they are a component of manufactured equipment. For more information consult the Biocenter EH&S Liaison.
- 4.15.2 Acids and bases should be used as outlined in the CHSP, Section G. Consult the Biocenter EH&S Liaison for additional guidance.
- 4.15.3 Solvents should be purchased and used in quantities as small as practical. Evaporation of solvents, when needed for experimental purposes, should be done in chemical fume hoods. The evaporation of solvents for the purpose of waste disposal is not permitted.
- 4.15.4 Flammables: Identification and control requirements for flammables and combustibles are contained in PUB-3000, Chapter 12. Flammable and combustible liquids (e.g., oils, greases, tars, oil-based paints, tars, and lacquers), are classified Class B Combustibles. Technically, flammable and combustible liquids do not burn. They can, however, generate sufficient quantities of vapors to form ignitable vapor-air mixtures. Make sure that Class B combustibles are properly identified, labeled, and stored. Use only approved containers, tanks, equipment, and apparatus for storage, handling and use of Class B combustibles. Store quantities of up to 38 liters (10 gallons) of flammable liquids (such as acetic acid and phenol) in approved storage. Label the contents of all containers accurately and conspicuously. Consult PUB-3000, Chapter 12 for information for identification and control requirements for other flammables and combustibles. The Biocenter EH&S Liaison provides assistance.
- 4.15.5 Chemical Reactions: Excessive pressure generated by a planned or unplanned chemical reaction should be minimized by working with as small as practicable amounts of chemicals, using appropriate reaction vessels, and providing adequate venting or pressure relief means. Personal protective equipment such as a laboratory coat, gloves, full-face shield, closed-top shoes and bench top shields will provide protection against flying glass and chemicals.
- 4.15.6 Space Renovation or Clean Out: Contact the Biocenter Building Manager before removing items from any space. The Biocenter Building Manager will arrange for personnel to inspect the items and area for toxic materials and contamination. Once the area has been monitored, the following dispositions can be made:
- 4.15.6.1 Uncontaminated material may be reused in another area, sent to

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

salvage, stored, or thrown away.

- 4.15.6.2 Toxic material may be used in another controlled area, disposed of through LBNL's Waste Management Group, or if properly labeled, may be stored for reuse in an area suitable for holding the items.

4.15.7 Leaving the Biocenter: Prior to terminating a position in the Biocenter, it is each individual's responsibility to ensure that all samples, equipment, and supplies are either transferred to another employee or properly disposed. Notify the Building Manager prior to leaving Biocenter.

## **4.16 Carcinogenic Material Controls**

4.16.1 Work with carcinogenic materials shall be performed in accordance with the LBNL PUB-3000, Chapter 4, and the CHSP, Section G.

4.16.2 Proposed work with carcinogenic materials not covered in PUB-3000 and the CHSP shall be reviewed by the Biocenter EH&S Liaison. This review will establish the need for NEPA and AHD documentation.

**4.17 Cryogenic Material Controls:** Work with cryogenic materials shall be performed in accordance with the PUB-3000, Chapter 7.8. Follow the following rules:

- Wear eye protection appropriate to the hazard. When pouring liquid nitrogen from a dewar, use safety glasses with side shields. However, when transferring liquid nitrogen from a pressurized dewar, use face shields.
- Wear cryogenic gloves when working on systems with exposed components at cryogenic temperatures to assure that skin will not freeze to cold pipes or metal parts. Gloves need to be loose fitting so they can be thrown off readily if cryogen is spilled into them. This assures that the cryogen will not be trapped against the skin. Small spills of liquid nitrogen on the skin will evaporate without damage unless the liquid is trapped against the skin.
- Do not use cryogenics in unventilated spaces, such as closets or experimental caves, without exhaust ventilation.\*
- When transferring cryogen from pressurized dewars with hoses or tubing, be sure to verify that there are pressure relief devices between all valves because it is easy to trap cryogen in the transfer hose or in the tube between two valves. In such a case, the hose will rupture and whip around out of control. Ensure transfer lines are rated for cryogenics.

\* **NOTE:** Two oxygen sensors have been placed in Lab #165 to monitor oxygen deficiency that may result from the cryogenic materials used with the Mass Spec. These sensors are set to alarm at 19.5% oxygen content or less.

**4.18 Biological Material Controls:** Work with biological materials shall be performed in accordance with the PUB-3000, Chapter 4, and the LBNL Biosafety Manual. Appropriate Biosafety Level (1 or 2) containment shall be used. Vacuum lines should be protected with in-line filters.

# Environment, Health & Safety Plan for Berkeley West Biocenter

July 2006

**4.19 Storage Practices for Chemicals:** Chemicals (both solids and liquids) shall be segregated to minimize the hazards associated with accidental mixing. Information on chemical storage and incompatibles may be obtained from the LBNL EH&S Division electronic MSDS Database (<http://www.lbl.gov/ehs/chsp/html/msds.shtml>). This information is available through the LBNL EH&S home page: <http://www.lbl.gov/Workplace/Lab-Support/>. The Biocenter EH&S Liaison can also be consulted. In general chemicals should be segregated according to the following categories:

- **Solvents**, which include flammable/combustible liquids and halogenated hydrocarbons (e.g. acetone, isopropyl alcohol, ethers, ethyl alcohol) Note: Treat glacial acetic acid as a flammable liquid
- **Inorganic acids** (e.g. sulfuric, and hydrochloric acid).
- **Bases** (e.g., sodium hydroxide, ammonium hydroxide)
- **Oxidizers** (e.g. nitric and hydrochloric acids)
- **Poisons** (e.g. acrylamide)
- **Peroxide formers** (e.g. Tetrahydrofuran, 2-butanol).

## Observe the following storage guidelines:

- Store all hazardous liquid chemicals in secondary containers that are chemically resistant and unbreakable.
- Examine stored chemicals that form peroxides (see Peroxide Former Guidance) for crystal formation, deterioration, container integrity and expiration date. Test peroxide content of designated chemicals on a prescribed schedule (as noted in the LBNL CHSP), and label with the peroxide concentration. Dispose of container that have a significant peroxide concentration (e.g., > 30 parts per million).
- Limit the amount of chemicals permitted for storage to amounts that are as small as practical.
- Avoid exposure of chemicals to heat or direct sunlight.
- Do not use fume hoods as storage areas for chemicals. Chemicals temporarily stored in hoods should be kept to a minimum and should not block vents or alter airflow.
- Install lips, strips, or bars across the width of reagent shelves to restrain the chemicals in case of earthquake (minimum 3-inches high as measured from the bottom of the shelf).
- Use flammable storage cabinets to store flammable liquids. PUB-3000, Chapter 12, Fire Prevention and Protection provides more information on safe handling and storage of flammable and combustible materials.
- Do not store chemicals in refrigerators used for food storage. Refrigerators used for storing chemicals or food must be appropriately labeled.
- Store explosive or unstable reactive chemicals outdoors in flammable storage cabinets.
- Explosion proof refrigerators are required if used for storing flammable liquids. Do not store ethanol in refrigerators unless they are explosion proof.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

Additional information on chemical storage is included in PUB-3000, Chapter 4, and the CHSP. Assistance can be provided by the Biocenter EH&S Liaison.

## **Hazardous material storage limits**

The limits for Building 977 are indicated in the California Building Code, Occupancy Classification B. The current inventory indicates that there are no classifications of hazardous materials that are near threshold limits.

The following table provides storage limits for hazardous materials common to the Biocenter. Changes to the inventory need to be reviewed periodically to assure continued compliance.

**Storage Limits for Building 977 Hazardous Materials<sup>1</sup>**

<b>Material</b>	<b>Solid <i>lbs</i></b>	<b>Liquid <i>gallons (lbs)</i></b>	<b>Gas <i>c.f.</i></b>
<b>Highly Toxics</b>	15	(15)	
<b>Toxics</b>	750	(750)	
<b>Corrosives</b>	7500	750	
<b>Irritants</b>	Not Limited	Not Limited	
<b>Sensitizers</b>	Not Limited	Not Limited	
<b>Oxidizing Gas</b>			2250

<sup>1</sup>If chemicals are stored in approved cabinets or approved exhausted enclosures, quantities can be increased 100 percent. Please note that these limits are at 75% of the established building code limits to account for the partial LBNL occupation of 717 Potter Street (Beyer maintains a presence of approximately 25% of the space).

Limits for other hazardous materials are included in the 2001 California Fire Code, Tables 3-D and 3-E. Contact the EH&S Biocenter Liaison for assistance.

**4.20 Inventory Controls for Hazardous Materials:** Inventories of all hazardous materials shall be maintained for each laboratory room and used in waste minimization efforts throughout the program.

**4.21 Noise Controls:** Operations in research laboratories may produce excessive noise. The Biocenter EH&S Liaison shall determine when the noise is excessive, and ensure that personal hearing protection is provided to room occupants or is available when working in rooms for an extended period of time.

## **4.22 Ionizing Radiation Controls**

Radioactive materials are used in at least three labs in the Biocenter: Lab 205, and Lab 285. A fully enclosed X-ray machine is located in Lab 203. All three rooms have restricted card key access so only appropriately trained personnel may enter the rooms.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

- 4.22.1 Training: All employees must receive radiation safety training prior to occupational exposure in a controlled area at a DOE facility. Non-radiation workers who are at risk of radiation exposure must take General Employee Radiological Training (GERT). Radiation workers must complete more comprehensive training (EHS 400 and 432) prior to conducting radiological work, which must be renewed every two years. All LBNL guests and visitors who enter the building will be provided GERT (pamphlet) upon signing in at the Barton Security Desk.
- 4.22.2 ALARA: Title 10 of the Code of Federal Regulations (CFR), Section 835.101(c), requires that there be a formal documented program at LBNL to ensure that radiation exposures are maintained as low as is reasonably achievable (ALARA). The primary mechanisms for training personnel, monitoring the workplace, controlling work activities, and maintaining radiation exposures ALARA are implemented through the radiological authorization system, worker training, and dose monitoring.
- 4.22.3 Work Authorization: The system of controlling work in areas with actual and potential radiological hazards is based on the issuance of a written authorization or permit. See Section 5.3. A written authorization is required prior to working with, or receiving, radiological materials.
- 4.22.4 Procurement of Radioactive Materials: Procurement of radioactive materials may only occur once an approved EH&S Radiological Work Authorization is in place. Contact the Biocenter EH&S Liaison for further information.
- 4.22.5 Transportation of Radioactive Materials: Transportation of radioactive materials is controlled by the Department of Transportation (DOT) 49CFR. Contact the EH&S Radioactive Materials Transportation Office on x 6228 for further information.
- 4.22.6 Postings: Laboratories where radioactive materials are present or ionizing radiation is generated are designated as "Controlled Areas for Radiological Protection" in order to alert personnel to potential radiological hazards. Controlled Areas are posted as such and may contain Radioactive Material Areas (RMA), Radioactive Material Storage Areas (RSA) and/or Radiological Areas. RMAs are posted wherever radioactive materials are handled and RSAs are posted wherever radioactive materials are stored. No items may be removed from a posted RMA or RSA without first being surveyed for contamination by an EH&S Radiological Control Technician (RCT).
- 4.22.7 Radioactive Waste: All radioactive must be generated per PUB-3092, "Guidelines for Generators to Meet HWHF Acceptance Requirements for Hazardous, Radioactive, and Mixed Wastes". No radiological material may be disposed of via the sanitary sewer and no radioactive materials, or items labeled as radioactive material, may be disposed of via the regular trash. Only LBNL RCTs may remove radioactive waste from RMAs or RSAs.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- 4.22.8 **Radioactive Material Spill Response:** If a spill of radioactive material occurs, follow the SWIMS guidelines and use the emergency response flip chart to call the appropriate RCT. Out of work hours (0800 – 1800 M-F) call x 6999 for urgent EH&S assistance. If there are injuries call x 9911.

SWIMS: (S): Stop and think. Stop Working. Stop the spill; (W): Warn others; (I): Isolate the area; (M): Monitor yourself completely and carefully; (S): Stay in or near the area until help arrives.

## **4.23 Non-Ionizing Radiation Controls**

The only significant type of non-ionizing radiation at the Biocenter is from ultraviolet light sources. The most effective methods of controlling UV radiation are enclosing or shielding the UV source and covering walls and surfaces with UV-absorbent materials. Where this is not practical, such as with portable sources, personal protective equipment and other controls such as the following shall be used.

- Only personnel familiar with the potential hazards and control measures shall use the ultraviolet source equipment. Contact the Building Manager for training.
- UV-emitting equipment shall be clearly labeled as an ultraviolet source with "Caution" signs. Additional warnings or limitations shall also be posted as appropriate.
- Photosensitive individuals should not be assigned to work with UV-emitting equipment. Personnel who regularly work with UV equipment should temporarily discontinue if they are on prescribed medication with photosensitive effects. Employees should be alert to the effects of such medications and notify their supervisors of any need for change of work procedures.
- The duration of exposure to UV radiation should be limited to maintain exposure to within acceptable guidelines as determined by the Biocenter EH&S Liaison.

- 4.24 **High Magnetic Field Controls:** The Mass Spectrometer (Mass Spec) machine located in Lab #165 utilizes the creation of a strong magnetic field. Large attractive forces are exerted on magnetic materials or equipment brought in close proximity to the Mass Spec magnet systems. These risks are minimized by controlling access to the Mass Spec room by anyone other than the designated, trained research staff and other authorized personnel (e.g., Biocenter EH&S Liaison, Building Manager). The door to the Mass Spec room has specific card key access control tied to the list of authorized personnel. Anyone else needing to enter the Mass Spec room can only do so in the presence of one of the authorized individuals. Appropriate hazard warning signs are posted.

- 4.25 **Personal Protective Equipment (PPE):** Identifying and understanding a workplace hazard and then matching the needed personal protective equipment to the hazard is the key to selecting effective and appropriate protection. Employees will use the appropriate personal protective equipment whenever they are potentially exposed to occupational hazards. Personal protective equipment (e.g., gloves, lab coats, face shields, mask, protective eyewear) is supplied to the employees when to minimize skin and eye exposure

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

from hazardous materials when working in the lab.

Standard laboratory PPE will consist of a lab coat, safety glasses with side shields and closed-toed shoes. Closed-toed shoes shall be worn to protect the feet from common laboratory hazards, (e.g., acids, bases, solvents, broken glass, etc.). In some operations where an impact hazard exists, safety shoes may be needed. Goggles and/or face shields may be worn to achieve greater eye protection when necessary. Select gloves on the basis of their chemical resistance to the material being handled. Gloves shall be replaced whenever torn and replaced with increased frequency when research activities cause glove fatigue. In addition, removing the lab coat and gloves prior to leaving the lab area helps prevent possible contamination of non-experimental areas. Respirators are not recommended and unnecessary when biological safety cabinets and fume hoods are available for use. Contact the Biocenter EH&S Liaison for more information.

- 4.26 Ergonomic Controls:** There are many ways to reduce or prevent Cumulative Trauma Disorder (CTD) injuries. Using ergonomically designed equipment, furniture, and accessories (including pipettes) will help provide flexibility and induce proper posture. Most importantly, periodic breaks are necessary to allow the tendons and muscles to rest and recuperate from repetitive motion. Ergonomic evaluations are available. For further information, review LBNL Health and Safety Manual, PUB-3000 Chapter 17, or contact the EH&S Liaison.
- 4.27 Seismic Controls:** To reduce the risk of personal injury, property damage, and programmatic interruption resulting from earthquakes, the divisions occupying the Biocenter, with assistance from LBNL Facilities Department, has the responsibility of ensuring that all equipment is properly secured or in a location that does not pose a risk. Additionally, all objects and materials must be properly stored according to the PUB-3000, Chapter 23. Typically all furniture or equipment more than 3 feet tall must be bolted to the floor or to the structure. Furniture or equipment three feet tall or less may still require securing if it can move as a result of seismic activity and affect egress. Lips on reagent shelves must be 3 inches high (as measured from the bottom of the shelf). Contact the Building Manager for assistance.
- 4.28 Engineering Controls:** Engineering controls, in combination with safe work practices that alter the manner in which tasks are performed, are expected to be the primary means of eliminating or minimizing the risk of occupational exposure. Engineering controls are used to isolate or remove hazards from the workplace in order to reduce the potential for exposure. Such engineering controls include, but are not limited to mechanical aids, sharps containers, laboratory fume hoods, biological safety cabinets, and negative airflow units.
- 4.28.1 Mechanical Aids:** Mouth pipetting of any substances is prohibited and the use of mechanical aids to transfer potentially harmful substances (i.e., biohazardous) is strictly enforced. Personnel shall use these devices for all pipetting in a manner that does not generate aerosols.
- 4.28.2 Fume hoods:** Fume hoods are commonly used in the laboratory to draw air away from the work area and away from the worker's breathing zone. Fume hoods are



# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

available in most laboratories within Biocenter and must not be used for storage of materials and equipment merely as a matter of convenience. Fume hoods must be certified every two years or more frequently if the flow indicator readings raise questions of adequate hood performance. Contact the Biocenter EH&S Liaison or the Building Manager for more information.

- 4.28.3 Biological Safety Cabinets: Biological safety cabinets provide sterile laminar airflow onto the work surface, containment of aerosols or droplets, and protection to the user. Class II Biosafety Cabinets (BSCs) are used at the Biocenter. The performance of each BSC must be verified at the time of installation, whenever they are moved, and annually thereafter. For more information regarding BSCs, see the CHSP, Section F or contact the EH&S Liaison for more information.
- 4.28.4 Containment Protection for Vacuum Systems: The aspiration of tissue culture media from monolayer cultures or of supernatants from centrifuge samples into primary collection flasks is a common laboratory procedure. Protection should be provided against drawing aerosols of hazardous chemical or biological materials or overflow fluid into the house vacuum system. This protection is provided by the use of an air filter in the line immediately leading into the house vacuum line and an overflow flask for liquids between the collection flask and the air filter. For more information regarding the assembly of this device, contact the Building Manager.
- 4.28.5 Sharps Disposal Containers: Sharps containers are used to dispose of contaminated sharps (e.g., needles, scalpels, broken glass, broken capillary tubes) that can penetrate the skin. Contact the Biocenter EH&S Liaison or the LSD / PBD Safety Coordinators for more information on Sharps containers.
- 4.28.6 Interlocks: Mechanical and electrical interlocks reduce the chance of a serious exposure by preventing access to the hazardous area or material. Interlocks may be found on equipment panels and on power supplies (e.g. centrifuges). Interlocks must never be bypassed or tampered with, except under very specific conditions approved by the Building Manager or the Biocenter EH&S Liaison.

## **4.29 Maintenance, Inspection and Quality Assurance of Safety Systems and Equipment**

- 4.29.1 Maintenance: The Building Manager coordinates with the Landlord to oversee the maintenance and inspection of safety systems and equipment. The Landlord manages facility maintenance contracts with external vendors. Contracts with facilities vendors include building and building systems maintenance, engineering and construction services, custodial services, pest control, and fire protection.
- 4.29.2 Ventilation System: During research operations, the air handling system must be operational to maintain a negative pressure in the laboratories relative to the halls and office spaces. The design of the building offers the possibility that general lab air can be recirculated within the building. A system of eleven emergency buttons stationed throughout the laboratory areas of the building allows for disabling of

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

the recirculation mode of the ventilation system in the event of an accidental release of hazardous materials or agents. The locations of these buttons are marked with the following specific instructions as per their intended use: "NOTICE Push button to stop recirculation in the event of a significant spill of volatile hazardous materials or other airborne concerns. Call the building manager; and, follow the appropriate emergency procedures."

The air handling systems are maintained on a regular schedule. Within the laboratory rooms, fume hoods must operate continuously to maintain the negative air balance. The hoods are inspected and tested on a regular basis by the Biocenter EH&S Liaison.

4.29.3 Emergency Generator: Stand-by power is available during power outages for emergency and safety systems and designated programmatic equipment.

4.29.4 EyeWash/Showers: These systems are flushed by LBNL Facilities on a quarterly schedule under the direction of the Building Manager.

## **4.30 Environmental Controls**

4.30.1 NEPA: All new or major changes to previously planned or ongoing experiments or operations ("proposed action") require an evaluation for compliance with the National Environmental Policy Act (NEPA). A proposed action is described as one over which DOE has control of responsibility (to include "work for others") and which has yet to receive a DOE NEPA review. The LSD or PBD Safety Coordinator assists in the preparation and coordination of review. Contact the Biocenter EH&S Liaison or Building Manager for more information.

4.30.2 Emission Controls: All air emissions shall comply with Bay Area Air Quality Management District (BAAQMD) requirements. If there is any question as to whether an operation complies with these requirements, contact the Biocenter EH&S Liaison for assistance in evaluating the emission sources and obtaining appropriate permits. Containers of volatile chemicals should be securely covered when not in use. Any hazardous material spill must be reported to the Biocenter EH&S Liaison and Building Manager immediately.

All Biocenter activities have been reviewed for compliance with the requirements of the Bay Area Air Quality Management District (BAAQMD). All fume hoods in the Biocenter facilities are used for standard analytical or bench-scale operations and have been exempted from air permit requirements. Chemicals shall not be evaporated in fume hoods for the purpose of disposal.

4.30.3 Wastewater Management Controls:

4.30.3.1 Sanitary Sewer System: There are local regulations about what may be poured down the drain. Floor sinks are provided for production equipment requiring drains. Cup sinks in all fume hoods have been sealed to prevent any release. Minimum one-inch berms are provided

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

to prevent any spilled hazardous materials from entering the sanitary sewer system. Sinks are connected to the sanitary sewer system. These sinks shall be used only for water soluble substances that don't exceed hazardous thresholds. Solutions of flammable substances must be sufficiently dilute that they do not pose a fire hazard. Acids and caustics should not be poured into the sewer drain unless their pH range is between 5.5 and 12. In addition, there are very low disposal thresholds for many heavy metals and chlorinated solvents. For more specific information, please contact the appropriate EH&S subject matter expert.

- 4.30.3.2 Storm Drainage System: Generally, no chemical discharges should be allowed to enter the storm drain system. In addition, discharges to the ground are not permitted without prior approval of the EH&S Division. Process water releases, spills (such as gasoline or diesel), or run-off from the outside emergency showers and eyewashes that may be accidentally discharged to the ground or to the storm drain must be contained and reported to the Building Manager for immediate cleanup. There are no known connections from within the Biocenter building to the storm sewer system.

- 4.31 **Waste Controls:** Various hazardous and biohazardous wastes are generated in small quantities on an irregular basis. All hazardous and biohazardous waste shall be managed according to procedures presented in PUB-3000, Chapter 20. Details are included in PUB-3092, "Guidelines for Generators to Meet HWHF Acceptance Requirements for Hazardous, Radioactive, and Mixed Wastes" at Berkeley Lab and PUB-3093, "Guidelines for Management of Waste Accumulation Areas (WAAs) at Berkeley Lab." The LSD or PBD Safety Coordinators will assist generators in complying with federal, state and local regulations and the policies of the LBNL Hazardous Waste Management Group. Generators are responsible for managing Satellite Accumulation Areas (SAAs). For any hazardous waste, the generator shall label each waste and store it in the Satellite Accumulation Area (SAA). The generator faxes a requisition to LBNL Waste Management Group when the hazardous waste is ready to be picked up. The LBNL Waste Management Group generates and signs the transportation manifest. The hazardous waste is picked up at the Biocenter and transported to an off-site treatment and disposal facility. The Biocenter WAA is authorized for use by an approved contingency plan.

All Medical (biohazardous) Waste is inactivated offsite by a licensed subcontractor. Generators are responsible for depositing biohazardous waste into sharps containers or laboratory biohazard waste containers lined with red biohazard bags, and weekly transferring closed biohazard bags into lined pick-up containers. Sharps containers may continue to be used until full. The LBNL Waste Management Group coordinates weekly Medical Waste pickup with the subcontractor that transports and treats the Medical Waste. The LBNL Waste Management Group signs the transportation document.

Disposal into the sanitary sewer is allowed for certain non-hazardous materials. Contact the Biocenter EH&S Liaison for information on waste management and sink disposal.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

- 4.32 Waste Minimization/Pollution Prevention Controls:** Both the DOE and LBNL are committed to waste minimization and pollution prevention. Various support services to assist in achieving waste minimization goals can be accessed through the Biocenter EH&S Liaison.
- 4.33 Spill Control:** An accidental spill of hazardous material could result in a seriously polluting discharge to either the storm or sanitary sewer system, or the ground and groundwater. Planning for prevention is the first step in effective spill control. Knowing where sinks drain, floor drains discharge, and whether storm drains are in close proximity to an operation, are important considerations in preventing unacceptable releases to the sewer system. Principal Investigators shall implement the following controls in their work areas:

## **4.33.1 Spill Prevention Procedures**

- Regularly review the plumbing inputs to the sanitary sewer, particularly after new construction, when incorrect plumbing connections may have been made.
- Provide secondary containment for chemicals.
- Store non-compatible chemicals in separate trays.
- If chemicals must be stored near an operational sink, place them in secondary containment.
- Place chemicals stored in breakable containers in a tray or non-breakable container that may serve as secondary containment. Segregate into separate trays any chemicals that would react if combined during a spill.

## **4.33.2 Spill Control:**

**4.33.2.1** If a spill occurs near a drain that is not blocked, cover the drain with impervious or absorbent materials to prevent or minimize entry of the spilled material to the sewer. Such material should be available near the drain in anticipation of use.

**4.33.2.2** Chemical Spill Cleanup Procedures: Employees may clean up small spills of hazardous materials provided that *all* of the following conditions are met:

1. The hazards of the material(s) are known, and appropriate precautions can be taken to prevent personal exposure
2. There is no potential of a release to the environment
3. There are no personal injuries
4. The clean up procedures are known and the proper equipment (e.g., PPE and spill clean up materials) is available
5. The spill can be cleaned up safely by two people in one hour or less.
6. The spill does not involve elemental mercury. Special cleanup and air monitoring is required. Contact the Biocenter EH&S Liaison.

## **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

**IF ALL OF THESE CONDITIONS ARE NOT MET THEN  
CALL 9911 AND NOTIFY THE FACILITY MANAGER AND  
EH&S LIAISON.**

Spill clean up kits for flammable liquids, acids, bases, petroleum products and other hazardous materials are located within the building. Laboratories and shop areas where hazardous materials are handled should have an adequate number of appropriate spill kits to meet anticipated needs. Further information on spill clean-up or hazard mitigation can be found on the Emergency Response Flip Chart posted in each lab at the Biocenter.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **5.0 WORK AUTHORIZATIONS**

- 5.1 Health and Safety Manual:** All work is required to be within the limits of the LBNL Health and Safety Manual, PUB-3000.
- 5.2 Biological Use Registrations and Authorizations:** Work with biological materials shall be performed in accordance with the PUB-3000, Chapter 4, and the LBNL Biosafety Manual. Work with biological materials at Biosafety Level 1 or Biosafety Level 2 containment requires review and approval by the Berkeley Lab Institutional Biosafety Committee. Work at Biosafety Level 2 is considered a formal authorization.
- 5.3 Radiological Work Authorizations:** All radiological work must conform to the requirements of the LBNL Health and Safety Manual, PUB-3000, Chapter 21. Before using radioactive material or a radiation-producing machine, the PI must obtain the approvals of the LBNL Radiological Control Manager and the cognizant division director. The Radiological Work Authorization (RWA) Program authorizes the use of radioactive materials and radiation-producing machines, except x-ray machines. X-ray machines are authorized by X-ray Authorizations (XA).

RWAs are issued for activities that are considered long-term projects under routine radiological conditions. The RWAs specify the quantitative limits on amounts of radioisotopes and the radiological conditions acceptable at the specified work areas. RWAs are classified, based on the degree of the associated hazards, as Class I, Class II, or Class III, with Class III designating the highest hazard class. An approved Class I or Class II RWA is valid for 18 months. An approved Class III RWA is valid for 12 months. The RWA will specify the limitations of its use. Materials exceeding the RWA limitations must not be used or ordered until the RWA is amended to include them.

- 5.4 Environmental Authorizations:** Activities have been approved as a Categorical Exclusion for compliance with the National Environmental Protection Act and a Categorical Exemption under the California Environmental Quality Act.
- 5.4.1 Airborne Emissions:** Airborne emissions have been reviewed and determined to be below reporting thresholds for requirements of the Bay Area Air Quality Management District.
- 5.4.2 Sanitary Sewer Discharge:** Discharges to the sanitary sewer have been reviewed with the East Bay Municipal Utilities District (EBMUD), and it was determined that no specific wastewater discharge permit would be required for sanitary sewer discharges.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

## **6.0 TRAINING**

- 6.1 General:** All employees must be trained appropriately before work begins. General training requirements are described in PUB-3000. Special training for the Biocenter training is described in this manual. All training, including Potter Street Orientation (PTR0010) and General Employee Radiation Training (EHS0405), will be made available in a timely fashion to Biocenter personnel.
- 6.2 Responsibility for Training:** The Supervisor is responsible for assuring that all of the people he/she supervises have the training required for the tasks assigned.
- 6.3 Training of Newly Assigned Personnel:** Newly assigned personnel are allowed to work under a qualified, trained supervisor for up to 180 days while receiving the required training.
- 6.4 Training of All Personnel:** All employees are provided Potter Street EH&S Orientation Training within 30 days of working at 717 Potter Street. The course consists of:
- Introduction to the LBNL EH&S organization and EH&S services at the Potter Street Biocenter
  - Emergency contact information and instructions
  - The Emergency Response Organization & Emergency Preparedness
  - Hazard communication including the handling of MSDSs and the Chemical Inventory
  - The Job Hazard Questionnaire (aka EH&S Training Questionnaire)
  - An overview of EH&S Training requirements including GERT
  - Discussion of safety equipment (safety showers/eyewashes, fire extinguishers, first aid kits, spill kits) and locations
  - The Facility Safety Plan – existence and purpose
  - Site Hazards Overview.
  - Work Authorizations for Biologicals and Radiation
  - Radiation Signs and Control Areas
  - Waste Handling Basics – Medical, Hazardous (Chemical), Radioactive
  - Waste Minimization & Recycling
  - Emergency Evacuation Procedures

In addition, all personnel are required to complete job-specific training. All on-the-job training is to be documented by the supervisor. Formal training is to be completed prior to starting a project. The following table lists courses that are required for the corresponding task.

# Environment, Health & Safety Plan for Berkeley West Biocenter

July 2006

TRAINING MATRIX			
Class Number	Class Title	Personnel Required	Periodicity
PTR0010	B Potter Street EH&S Orientation Training	All Biocenter personnel including Wareham engineers & custodial staff	One time - within 30 days of Biocenter occupancy/assignment
EHS 348	Chemical Hygiene and Safety	All lab and receiving personnel	One Time
EHS 405	General Employee Radiological Training (GERT)	All Biocenter personnel including Wareham engineers & custodial staff	One time upon beginning work and every two years thereafter.
EHS 400	Radiation Protection - Fundamentals	All personnel who work in a RMA or RSA	One Time
EHS 401	Radiation Protection - Retraining	All personnel who work in a RMA or RSA after the initial course (EHS 400)	Every 2 years
EHS 432	Radiation Protection –Laboratory Safety	All personnel who work in a RMA or RSA	Every 5 years
EHS 735/738	Bloodborne Pathogen Training	All personnel who work with human blood and tissues, or other potentially infectious materials subject to the OSHA Bloodborne Pathogen Standard.	Within 30 days of assignment to areas having bloodborne pathogens PLUS annual refreshers
EHS 739	Biosafety Training	All lab personnel who work with biological materials – regardless of risk group.	One Time
EHS 730	Medical Waste Training	All lab personnel who work with biological materials – regardless of risk group.	One Time
EHS 604	Hazardous Waste Generator	All lab personnel who generate hazardous waste	One Time
EHS 622	Radioactive Mixed Waste Generator Training	All lab personnel who generate radioactive and mixed waste	One Time
EHS 060	Ergonomics for Computer Users	All those who use a computer for four hours or more per day on average	One Time
EHS 154	Building Emergency Team Training	Emergency Team	One Time
EHS 116	First Aid	Emergency Team	One Time
EHS 530	Fire Extinguisher Training	Emergency Team	One Time
EHS 256	Lockout/TagOut	As required	One Time (unless deficiencies)
EHS 231	Compressed Gas Safety	Workers involved in installation, use, and change-out of compressed gas cylinders	One Time
EHS 283	Ultra Violet User Safety	Personnel who use UV light sources	One time
DOT/IATA	DOT Basic Modules	Personnel involved in shipping hazardous materials.	Every 2 years



# **Environment, Health & Safety Plan for Berkeley West Biocenter**

July 2006

## **7.0 REPORTING**

### **7.1 Emergency Reporting**

#### **7.1.1 Emergency Notification:**

#### **IN CASE OF EMERGENCY:**

##### **DIAL 9-911**

**Call for help with all types of emergencies: medical, fire, vehicle accident, explosion, or hazardous chemical spill.**

#### **IN CASE OF WORK RELATED INJURY OR ILLNESS:**

- **DURING DAY SHIFT HOURS, the following reporting procedures apply:**

1. **INFORM** your supervisor of your work-related injury or illness.
2. **CONTACT LBNL HEALTH SERVICES, BLDG. #26 AT 510-486-6266.**  
They will instruct you on whether to report to them or to go to another medical services provider. **IF SERIOUS**, the 9-911 Operator will dispatch an ambulance or fire truck.
3. **NEAREST 24-HR MEDICAL SERVICES:**  
**Alta Bates Hospital . . . . . (510) 204-4444**  
**3001 Colby St.**  
**Berkeley, CA 94705**

- **ALL OTHER TIMES (After Day Shift Hours/Weekends), the following applies:**

1. **INFORM** your supervisor of your work-related injury or illness.
2. For Urgent/Immediate care go to Alto Bates Hospital Emergency Room or contact your Health Care Provider directly

#### **7.1.2 Reporting an Emergency: Emergency Response Requests are directed to an emergency dispatch center.**

##### **7.1.2.1 Take the following action when an emergency situation arises:**

1. **DIAL 9-911** (the emergency number).
2. Give **YOUR NAME** and the **PHONE NUMBER** you are calling from.
3. State the **LOCATION OF THE EMERGENCY**.
4. Describe **WHAT HAPPENED** and your estimate of the situation

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

(i.e., number of injuries, spill of hazardous material, fire).

5. ANSWER ANY QUESTIONS asked by the emergency dispatcher (STAY ON THE LINE until the dispatcher hangs up).

7.1.2.2 Take remedial action, but only if you don't endanger yourself:

1. Give emergency aid to the injured, but remove them only if there is threat of further injury.
2. Isolate the affected area, and prevent fire or spills of hazardous materials or waste from spreading if this can be done safely.
3. Standby to meet emergency response personnel at the building entrance reported to them and be prepared to assist them if requested.

7.1.2.3 Notify supervisor(s).

- 7.1.3 Building Emergency Plan: Details of building emergency procedures are contained in the Biocenter Emergency Plan. The City of Berkeley provides emergency Response. If total evacuation of any building in the Biocenter is necessary because of fire, hazardous material spill, or other major hazard, notification to building occupants will be accomplished by using the established building emergency evacuation procedures. Verbal messages and specific instructions also will be transmitted by the Building Emergency Team. The Building 977 Emergency Plan is available from the Building Manager.

Evacuate the building immediately in accordance with the emergency plan. Do not stop to secure documents or personal belongings. Upon evacuation, proceed directly to the assembly area at the designated locations in the parking lot immediately north of 717 Potter Street. See the Building Manager for more information.

## **7.2 DOE Reporting**

- 7.2.1 Supervisors Accident Analysis Report (SAAR): Supervisors are required to fill out the upper part (who, what, when, where) of the SAAR form and fax to LBNL Health Services (510) 486-7192 for all injuries and illnesses. SAAR forms are available from the Biocenter EH&S Liaison.
- 7.2.2 Worker's Compensation and DOE Computerized Accident Incident Reporting System (CAIRS): Each member laboratory will report injuries and illnesses for their employees through the member laboratory's DOE CAIRS system and the member laboratory's Workers Compensation system. Copies of SAAR reports from LBNL will be provided to member laboratories.
- 7.2.3 Occurrence Reporting and Processing (ORPS): Incidents that exceed certain thresholds (severity of injuries, spread of radioactive contamination, value of property loss, potential public health or environmental consequences, etc.) must also be reported to DOE. As a general guideline, any incident that requires assistance from outside sources must be reported to the Facility Manager as soon

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

as practical. Line management from LSD or PBD, with the assistance of the Biocenter EH&S Liaison, is responsible for preparing reports to be submitted by the LBNL Occurrence Reporting Office to DOE.

- 7.3 Environmental Release Reporting:** Environmental releases are reported by the Building Manager to the LBNL EH&S Incident reporting number (x6999). LBNL Environmental Services Group transmits the necessary information to appropriate external agencies as required by federal, state and local notification requirements.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

---

July 2006

## **8.0 FEEDBACK AND IMPROVEMENT**

Activities and projects are reviewed through various assessments. These include the Biocenter self-assessment, annual functional appraisals of institutional activities such as the management of receiving, transportation and WAAs, EH&S inspections, the Integrated Functional Appraisal (IFA), the Safety Review Committee (SRC) Management, Environment, Safety and Health (MESH) Review, and regulatory inspections and audits by external agencies such as the City of Berkeley. Evaluations of the Safety Committee's results are given to the individual principal investigator, manager or supervisor to facilitate improvements at the working level. This provides the opportunity for improved EH&S performance or for sustained excellence for each of the activities covered during such assessments.

# **Environment, Health & Safety Plan for Berkeley West Biocenter**

**July 2006**

## **9.0 REFERENCES**

1. LBNL, Integrated Environment, Health and Safety Management Plan, PUB-3140, June, 1998.
2. LBNL, Health and Safety Manual, PUB-3000.
3. LBNL, Chemical Hygiene and Safety Plan, PUB-5341.
4. LBNL, Self-Assessment Manual, PUB-3105.
5. Guidelines for Generators to Meet HWHF Acceptance Requirements for Hazardous, Radioactive, and Mixed Wastes, PUB-3092.
6. Guidelines for Management of Waste Accumulation Areas (WAAs), PUB-3093.
7. Radiation Protection Program for the Lawrence Berkeley National Laboratory, 6<sup>th</sup> edition
8. LBNL Waste Accumulation Area (WAA) Contingency Plan for 717 Potter Street
9. General Employee Radiation Training (GERT) Procedure for Guests, Visitors, and Contractors Entering 717 Potter Street (Building 977)